

University of Groningen

## Stabilization with Guaranteed Safety of Nonlinear Systems

Romdlony, Muhammad Zakiyullah

**IMPORTANT NOTE:** You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

*Document Version*

Publisher's PDF, also known as Version of record

*Publication date:*

2018

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Romdlony, M. Z. (2018). *Stabilization with Guaranteed Safety of Nonlinear Systems*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.

### Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

### Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

## Propositions

1. There is a duality between the stability analysis and safety analysis. One can analyze the safety of a control system using analogous theories for studying systems' stability. (Chapter 3.)
2. The time-scale separation assumption in the design of a multi-level controller is no longer suitable for the control design of safety-critical systems. (Chapter 3.)
3. For guaranteeing systems' safety, the potential function does not need to be unbounded on the boundary of the unsafe state. (Chapter 3.)
4. Input-to-state stability with respect to an invariant set is not equivalent to input-to-state safety. (Chapter 4.)
5. Understanding systems' fragility is as important as studying systems' robustness. (Chapter 4.)
6. When one has apriori knowledge on the mathematical structure of the underlying systems, it may simplify the design of stabilizing controllers with guaranteed safety. (Chapter 5.)
7. A PhD study trajectory may be a (non-unique) solution to a port-Hamiltonian system where the effort and flow variables are the research effort and publication flow, respectively.
8. "We may regard the present state of the universe as the effect of its past and the cause of its future." (Pierre Simon Laplace, *A Philosophical Essay on Probabilities*).
9. Religion is not a poison for the mind but rather a system for proving the existence of the creator of the universe.